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Organic Semiconductor Dyes and Their Photoelectric Properties

decreases gradually, transferring its molecules from a normal state to one having a higher energy (excited state). The conclusion is drawn from this phenomenon that a decrease in the quantum of the optic excitation indicates both the ease with which the electron is torn away from the molecule of the colored organic compound and the occurrence of electroconductivity in it. This is confirmed by examples of certain organic dyes, such as the cation (basic), anion (acidic) and non-salt dyes (containing non-charged molecules) in the form of polycrystalline or amorphous compact layers. The measured currents in these are found to be 10^{-4}-10^{-8} μa or less. The specific electroconductivity of most dyes, regardless whether they consist of neutral molecules or molecular ions, is found to be within the range of 10^{-10} -10^{-15} $ohm^{-1} \cdot cm^{-1}$, at room temperature in a vacuum (Ref. 4, 5). Thus dyes may be classified as semiconductors, bordering on insulators. Contrary to these, non-colored compounds, such as amino acids, polypeptides, proteins, etc., are typical insulators in the dry state. The electroconductivity of a dye

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layer increases with an increase in temperature according to the exponential law, which applies to self-conductivity of inorganic semiconductors:

$\sigma = \sigma_0 e^{-\frac{E_T}{2kT}}$ (1), where σ is the specific conductivity of the given object at an absolute temperature $T(^{\circ}K)$, σ_0 is the constant of the given substance, $k=0.86\ 10^{-4}$ ev/degree is Boltzmann's constant. E_T is the lowest threshold energy value of the given substance spent on the formation of a free charge carrier of the current in it, which then moves along the applied electrical field. If the temperature relationship is converted to the linear form as a function of $1/T$, then the formula $\ln\sigma = \ln\sigma_0 - \frac{E_T}{2kT}$ (2) is obtained, and from the slope of this line the thermal activation energy of conductivity, E_T, can be determined which is characteristic for the given substance, and by extrapolating the line to the ordinate axis the value of σ_0 can be found. The conductivity of the dye layers and their photocon-

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ductivity are of an internal nature, not resulting from admixtures. This assumption was based on a strict adherance to formula (2) at a constant value of E_T within a wide temperature range from -100 to +200°C and on the relationship between E_T and the threshold value of the light quantum $h\nu_{ph}$ causing photoconductivity, and also on maintaining the specific conductivity value after a thorough chromatographic purification of the dye. The values of σ_o and E_T, which determine the electroconductivity, vary for different dyes within a wide range and it was impossible, therefore, to classify the values with the dyes. The qualitative relationship of the preexponential factor σ_o to E_T is pointed out, however, whereby high values of the constant σ_o were frequently found to be accompanied by high values of the thermal threshold activation energy E_T, similar to the kinetics of other physico-chemical reactions. The multi-nuclear, almost black dyes were found to have a high electroconductivity. The example of cynantrone ($\sigma_o = 10^{-6}, E_T = 0.2ev$) is given amongst others. Complex aromatic products of resinification and graphitization of organic films have a conducti-

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vity equal to 10^{-3} -10^{-1} $ohm^{-1} \cdot cm^{-1}$ at 20°C with a very low activation energy E_T = 0.1-0.2 ev. In discussing the photoelectric effect in dyes the author points out that when a layer of the dye is irradiated with visible light, the latter liberates a great number of new charge carriers, the concentration of which is 10^3-10^4 times greater than that of carriers created by the thermal effect or at room temperature. Fig.2 shows two examples of different inertia of photocurrent accumulation and its decrease after the light source has been removed. One of the main characteristics of photoelectric sensitivity of dyes is said to be the magnitude of the exiting photocurrent, which, in turn, is determined by the number of charge carriers created in the layer relative to the number of visible light quanta absorbed in it, i.e., the quantum exit φ (in %). The maximum value of φ was found for anthracene, as compared to other single crystals of aromatic and heterocyclic multi-nuclear compounds. Contrary to inorganic semiconductors, organic semiconductors including dyes have absorption bands limited at both ends even in their compact layer and corresponding in their position to

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bands of isolated molecules of the same dye in solution. Photoconductivity also increases exponentially with an increase in temperature, but less abruptly than the darkness conductivity. The thermal threshold activation energy of photoconductivity E_{ph} is somewhat less than E_T, viz., 0.2-0.3 ev, and fluctuates in a comparatively narrow range. A gas medium is said to have a significant effect on the darkness conductivity in many cases and also on the photoconductivity. Molecules of oxygen, quinone, iodine, chloroform, having a characteristic resemblance to the electron, are capable of suppressing the photoconductivity of organic semiconductors, which have an electronic conductivity. It is assumed that an electron capture of the conductivity electrons takes place here by the adsorption molecules of the electro-negative gas. In the case of dyes with a hole conductivity, oxygen and quinone ensure an increase in the darkness and light conductivity due to the many centers of capture which are created. In powerful illumination, even in an atmosphere of dry oxygen, a photochemical reaction of oxidation

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of the thin dye layer is noted, which results in the gradual non-reversible drop in the photoconductivity. The adsorption of water vapors on salt-like dyes causes a significant darkness conductivity, which rapidly increases with an increase in the vapor pressure. The latter points to the electrolytic origin of the conductivity. An independent electromotive force is created when illuminating precontact layers, in systems where so-called locking or rectifying particles of altered substance have been formed on the contact surface of the semiconductor and the metal electrode. The emf occurs in certain combinations of the objects without an external current source. The dye layer in contact with the metal or semiconductor is considered to be a so-called valve-type photoelement, which creates a difference of potentials on the electrodes as a result of light absorption. In this photoelement light energy can easily be converted to electrical energy in the circuit connected up to it. The photoelements of organic origin are considered of interest in determining the direction of the electron motion occurring either from the metal to the organic dye or vice versa. Thus the

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elementary oxidation-reduction process with the participation of the dye molecules can be directly measured electrically under "dry" conditions. Further reference is made to the so-called photogalvanic photoelements, i.e., of the liquid type. The emf which can be created in these systems by illumination can reach several tens of volts. Photogalvanic elements containing dissolved dyes in their composition are acquiring not only a theoretical significance, but render it possible to store light energy with its subsequent utilization as current (Ref. 27). Ye.K. Putseyko conducted experiments at the VKhO laboratory for producing photocurrents in an organic semiconductor using interrupted illumination. Interrupted diffusion currents were formed causing the formation of a photoelectromotive force of 0.01-0.1 mv on the linings of the capacitors, which is measured after being amplified (Ref. 28, 29). The method used by Putseyko could be applied to measuring the sign of the photocurrent carriers in dyes of various classes by certain improvements made in the technique. The method could also be used for measuring with adequate resolution the spectral photoelectric sensitivity

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of several natural and synthetic tetrapyrrol pigments, such as chlorophyll and phthalocyanines. It was also found that the normal sign of the carriers is positive. I.A. Akimov in the same laboratory applied a sensitive method to the detection of diffusion photocurrents in the illumination of the surface of the semiconductor layer, which was based on measuring the contact difference of potentials between the surface and the auxiliary electrode. The spectral distribution of the photoelectrical sensitivity of certain organic pigment layers and also the sign of the charge of the photocurrent carriers were determined by the method, corresponding to that of the photo-emf in a stationary capacitor under interrupted illumination. Other methods for the investigation of electron transfer in organic semiconductors were investigated by the author and coworkers, including that of illumination of the dye layers with UV radiation in a vacuum, resulting in the emission of electrons from the surface (external photoelectric effect). The author, Putseyko and Akimov were able to establish and investigate the sensibilization phenomenon of inorganic semiconductors to light absorbed by the dye

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molecules which are adsorped on their surface by using the capacitor method for measuring the photo-emf. Measurements of the diffusion photocurrents by the capacitor method and also that of the photoconductivity in interrupted or continuous illumination revealed that the inorganic semiconductors investigated coated with the dyes acquire a photoelectric sensitivity in that part of the spectrum, where they are transparent, and do not have their own photoelectric sensitivity (Fig. 5). The mechanism of the photoelectric sensitivity of the inorganic semiconductors (ZnO, PbO, TlHal, etc.), is based on the transfer of the electron from the level of admixtures to the conductivity zone (electronic type) or from the basic-valency zone to the admixture acceptor levels of capture (the hole type). It was established from investigations that certain dye molecules, located on the surface of the semiconductor, spend the obtained excitation energy with great effectiveness on the performance of the same processes taking place in the carrying conductor. In discussing the mechanism of the charge transfer in dyes, the author refers to the experiment performed by Vartanyan (Ref. 34), which

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proved that the electrons liberated first by light are retained or captured in the lattice in certain intermediary states and require additional energy to be liberated from this state. The presence of the thermal energy E_{ph} of activation in photoconductivity is explained by this additional thermal energy. Regarding the nature of the electron capture in organic photo-semiconductor dyes the capture level is thought to lie lower than the excitation energy level of the dye molecule. Migration of the excitation energy is described as taking place without expenditure of the so-called "exciton", both in organic crystals and inorganic semiconductors. The sign measurements of the photocurrent carrier showed that in addition to dyes where the photocurrent is transferred by electrons another large group exists where the photocurrent carriers have a positive sign and the corresponding dyes then belong to the "hole" type of conductivity and photoconductivity. A difference between the hole mechanism and that of the electronic photoconductivity described does not exist. Both processes are examples of oxidation-reduction reactions of the electron exchange with neighboring particles.

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Organic Semiconductor Dyes and Their Photoelectric Properties

There are 5 figures, 2 tables and 38 references: 12 are Soviet, 20 English, 6 German.

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69272
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E201/E691

AUTHORS: Sidorov, A.N. and Terenin, A.N.

5.3820 24.3410

TITLE: The Infrared Spectra of Chlorophyll and Its Analogues

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 4, pp 482-491 (USSR)

ABSTRACT: The authors obtained the infrared absorption spectra of pheophytin, chlorophyll, Zn-, and Ni- and Cu-pheophytins in the form of solid films (Fig 3) and solutions in CCl_4 and in a mixture of pyridine and CCl_4 (Fig 4). Measurements were carried out mainly in air, except for some control tests in vacuum. In the 700-3800 cm^{-1} region the solution concentrations were 0.5 mole/litre, and cells of 0.1 mm internal thickness were used. In the 1800-3800 cm^{-1} region the authors used also dilute solutions in CCl_4 (concentrations of ~0.001 mole/litre, and internal cell thicknesses of 10-30 mm). The absorption spectra were recorded with a double-beam infrared spectrophotometer UR-10 (Carl Zeiss, Jena) with NaCl and LiF prisms. The results obtained (Figs 2-5 and a table on p 486) lead to the following conclusions. Introduction of a metal atom into the pheophytin molecule produces considerable changes in its spectrum, showing that such an atom acts not only on the nearest neighbours with

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The Infrared Spectra of Chlorophyll and Its Analogues

which it is bound directly, but also on the atomic groups at the periphery of the molecule. Pyridine forms a complex with chlorophyll by attaching itself directly to the central atom of magnesium. The effect of pyridine is transmitted through the magnesium atom to the whole molecule of chlorophyll and produces stabilization of the keto-form (Fig 2) of its cyclopentane ring. It is not necessary to have a metallic atom in the chlorophyll molecule in order to prepare a complex of the latter with water (cf. spectra shown in Fig 5). However, a metallic atom, particularly that of magnesium, activates the chlorophyll molecule so that it forms a complex with water more easily and the resultant complex is more stable. There are 5 figures, 1 table and 16 references, 5 of which are Soviet, 8 English, 1 mixed (Soviet and English), 1 German and 1 translation.

SUBMITTED: July 10, 1959.

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83925

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E201/E191

5.5310

AUTHORS: Shablya, A.V., and Terenin, A.N.

TITLE: The Spectrum of a Negative Phthalocyanin Molecular Ion

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, No 4, pp 533-535

TEXT: The absorption spectra of negatively charged molecules of naphthalene, anthracene, phenanthrene, etc., consisting of bands in the visible region, were reported by several workers (Refs 1,2). These molecular ions were produced by reacting solutions of such hydrocarbons with metallic sodium in vacuum (Ref 3). The same technique was employed to produce molecular negative ions of magnesium phthalocyanin and of chlorophyll in 10^{-5} mm Hg vacuum. Tetrahydrofuran or diethyl ether were used as solvents. The concentration of the solutions was about 10^{-3} mole/litre. A vacuum cell employed by the authors is shown schematically in Fig 1. The solutions were poured into branch C of the cell (Fig 1) which contained a sodium mirror. The absorption spectra, recorded using spectrophotometers СФ-2М (SF-2M) and СФ-4 (SF-4) directly after treatment with sodium (Fig 2), showed that the new product had a spectrum with maxima at 570, 640 and 950 mμ (the latter was weak). After 40 hours the 950 mμ band disappeared completely and new bands

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The Spectrum of a Negative Phthalocyanin Molecular Ion

appeared at 530 and 790 mμ. When air was let into the cell original phthalocyanin was rapidly generated; it had an absorption spectrum with maxima at 610, 640 and 675 mμ. It was concluded that the primary product, produced by capture of sodium electrons by the dye, was first adsorbed on the metal. The observed absorption spectrum and red colour were due to a more stable secondary product, produced by an interaction of primary ionic radicals with each other and with the metal (spectra of the primary products were not observed at all). Experiments with chlorophyll gave no interpretable results because moisture could not be removed entirely. Reaction of metal-less phthalocyanin with sodium produced sodium phthalocyanin. Acknowledgements are made to P.A. Moshkin for supply of pure tetrahydrofuran.
There are 2 figures and 9 references: 3 Soviet, 4 English and 2 French.

SUBMITTED: May 20, 1960

Card 2/2

TERENIN, A.N.

Problems of energy and electron migration in photosynthesis and oxidation; general discussions of the Faraday Society, Apr. 14-16, 1959. Biokhimiia 25 no.1:180-186 Ja-F '60. (MIRA 13:6)
(PHOTOSYNTHESIS) (OXIDATION-REDUCTION REACTION)
(FORCE AND ENERGY)

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AUTHORS: Yermolayev, V. L., Terenin, A. N.

TITLE: Intramolecular Energy Transfer on Triplet Levels

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 71, No. 1, pp. 137-141

TEXT: The present paper is a continuation of a number of previous investigations (Refs. 1-7), that had dealt with similar problems. It was the aim of the investigation under review to show that an intramolecular energy transfer from the triplet level of a carbonyl group to a triplet level of diphenyl- or naphthyl group is possible. For this purpose, the authors investigated the spectra and the duration of phosphorescence in a series of diphenyl ketones, naphthyl ketones, and aldehydes. The clearest results were obtained with phenyl-4-diphenyl ketone (phenyl-4-benzophenone), the absorption spectrum of which at -196°C in ethanol ether (mixture 2:1) is shown in Fig. 1. The benzophenone spectrum taken under the same conditions, is also shown for a comparison. Phenyl diphenyl ketone exhibits two bands; a scheme of the electron level of this compound is shown in Fig. 3. Numerous details are given, concerning the spectra that were

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AUTHORS: Vilesov, F. I., Terenin, A. N., Academician

TITLE: Photoelectric Emission From Solid Layers of Organic Dyestuffs

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 5, pp. 1060 - 1063

TEXT: The authors studied the energy distribution of photoelectrons on rhodamine 6G, erythrosine, β-carotene, nonmetallic phthalocyanine, and zinc phthalocyanine. The measurements were made by the method of the retarding field in a spherical condenser. In Fig. 1 the authors show the spectral distribution of the quantum yield of photoelectric emission for erythrosine, rhodamine 6G, and β-carotene in relative units (in the semilogarithmic scale). Figs. 2 and 3 show the energy distribution of photoelectrons of rhodamine 6G- and β-carotene layers for varying photon energies. Table 1 gives the work functions and Fermi levels for all dyestuffs investigated:

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Dyestuff	Work function	Fermi level
Rhodamine 6G	5.7 ev	4.8 ev
Erythrosine	5.5 ev	5.5 ev
Zinc phthalocyanine	6.0 ev	5.4 ev
Nonmetallic phthalocyanine	6.0 ev	5.0 ev
β-carotene	5.5 ev	5.4 ev

In rhodamine 6G, two groups of electrons were found in the light quantum range of 6.5-10 ev. It is pointed out that neither the thickness of the layer (0.01 - 1.0 μ) nor the manner of its production (sublimation in vacuum or precipitation from any solution) have any effect on the character of energy distribution of electrons or on the work function. The maximum of slow electrons remains, with an increase in the light quantum energy of up to 10 ev, in the same place whereas the maximum of fast electrons shifts in the direction of higher energy. In β-carotene, only the group of slow electrons was found in the energy range of 6.0-9.5 ev; a group of fast electrons appeared only with energies of more than 10 ev. The authors obtained similar results for the other dyestuffs. They refer to analogous energy distributions which other authors obtained for non-

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Photoelectric Emission From Solid Layers of Organic Dyestuffs

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organic semiconductors. According to the authors of the present paper, the two mechanisms suggested for the explanation of the maximum of slow electrons cannot be applied without additional hypothesis to the dyestuffs investigated here. The authors conclude from the results compiled in the table that the slow electrons are of the same origin in all dyestuffs investigated here. According to the authors' opinion, the energy of the light quanta absorbed is scattered on intramolecular oscillations and electron transitions, which leads to an uncommon photoeffect. Finally, the authors discuss details of light-quantum absorption and electron emission. There are 3 figures, 1 table, and 8 references: 4 Soviet, 2 US, and 2 German.

ASSOCIATION: Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova (Institute of Physics of Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: May 9, 1960

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B019/B060

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26.2420

AUTHORS: Vilesov, F. I., Terenin, A. N., Academician

TITLE: Photoelectric Emission of Solid Layers of Pinacyanol and Pinakryptol

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 1, pp. 71-73

TEXT: In a previous paper (Ref. 1) the authors had supplied data regarding the photoelectric emission of precipitated layers of rhodamine 6G, erythrosine, metal-free phthalocyanin, zinc phthalocyanin and β-carotin. On the basis of their results they mentioned a possible scattering of light-quantum energy by vibrations and electron transitions inside the molecules. In continuation of their studies the authors used the same experimental arrangement to investigate the photoelectric emission of polycrystalline layers of pinacyanol and pinakryptol. The latter were prepared by precipitation from alcohol solutions on nickel disks. Fig. 1 shows the spectral distribution of the quantum yield of the

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Photoelectric Emission of Solid Layers of Pinacyanol and Pinakryptol

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photoelectric emission of layers of the two compounds examined here. In the photon energy range of 7 - 11 ev, the spectral distributions differ little from the pigments studied earlier. Starting from the photoelectron energy distributions regarding the two substances under examination (Figs. 2 and 3), the authors made use of Einstein's photoeffect formula to determine the work function of the electrons and obtained 4.9 ev for pinakryptol and 5.2 ev for pinacyanol. The low quantum yield of photoelectron emission is ascribed to a low electron density in the filled band or a low probability of its splitting. The latter can be related to a scattering of the quantum energy by intramolecular vibrations. It is pointed out that the energy loss of electrons in pinakryptol is much larger than in other pigments. The energy distributions of photoelectrons for pinacyanol with various photon energies are illustrated in Fig. 3, and are thoroughly discussed. Owing to the occurrence of a peak in the range of low photoelectron energies, variations in photoelectron distribution with various photon energies, and a comparison with results of investigation on inorganic semiconductors, the authors believe that there arise discrete photoelectron energy losses. These discrete energy

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Photoelectric Emission of Solid Layers of Pinacyanol and Pinakryptol

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losses equal the forbidden band width. The authors concede, however, that this view does not easily harmonize with the fact that the photoemission yield also rises somewhat in that photoelectron energy range where the slow electrons exhibit a peak. The results obtained here are finally said to prove that an energy scattering by intramolecular and lattice vibrations is less strong in pinacyanol than in pinakryptol. The two substances studied here have about the same work function for photoelectrons, but exhibit a different photoelectron energy distribution. There are 3 figures and 2 references: 1 Soviet and 1 US.

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova (Scientific Research Institute of Physics of Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: May 30, 1960

Card 3/3

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9,4160 (3201, 1331 only)
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S/020/60/135/001/021/030
B004/B056

AUTHORS: Akimov, I. A., and Terenin, A. N., Academician

TITLE: Sensitization of the Photoeffect in Semiconductors by Means of Organic Dyes, Which Are Acidity Indicators

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 1, pp. 109-112

TEXT: The authors investigated the photoeffect in thallium iodide and zinc oxide, which had been dyed by means of organic indicators. Measurement of the photoeffect was carried out in air and in vacuo, as well as after adsorption of anhydrous HCl and NH_3 vapor. Between the results obtained in air and in vacuum there was no difference. Aurin, safranine T, thymolphthalein, bromothymol blue, Nile blue, and Congo-red were used, whose structural formula, reaction-pH, λ_{max} and sensitizing effect upon TlI and ZnO are given in Table 1. Besides, experiments were made with malachite green, erythrosine, and methylene blue (Fig 3). The spectral distribution of the photo-emf is represented in Figs. 1-3. The

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Sensitization of the Photoeffect in Semiconductors by Means of Organic Dyes, Which Are Acidity Indicators

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summational photoeffect sensitized by the indicators changes in the case of TlI after adsorption of HCl only little, but the spectral distribution changed in accordance with the absorption spectra of the dyes. After adsorption of NH_3, the sensitized photoeffect decreased or had vanished altogether. In ZnO, on the other hand, the photoeffect vanished after adsorption of HCl. After desorption of HCl, ZnO again possessed the initial sensitized photoactivity. The indicators thus sensitize in neutral form both the photoeffect of the p-type semiconductor TlI, and also that of the n-type semiconductor ZnO. In the protonized state (after adsorption of HCl), they are no longer able to sensitize ZnO, nor to sensitize TlI in the anionic state (deprotonized by NH_3). These effects are explained by the change in the electron acceptor levels at the surface of the semiconductor, which, in ZnO, are formed by the adsorption of oxygen ions, and in TlI by adsorbed iodine ions. The authors mention a paper by Ye. K. Putseyko. There are 3 figures, 1 table, and 4 references. 5 Soviet, 1 US, and 1 French.

SUBMITTED: July 8, 1960

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TERENIN, ALEKSANDR N.

report to be submitted for the IUPAC 21st Conference and 13th Intl. Congress of Pure and Applied Chemistry, Montreal, Canada, 2-12 August 1961.

GORODISKIY, G. V., Academy of Sciences UkSSR, Kiev - "The oscillographic investigation of the electrochemical kinetics in fused salts" (Section A.3,e.2 - Session I, 11 Aug 61, afternoon)
GURVICH, L. V., Academy of Sciences USSR, Moscow - "The calculation of thermodynamic functions of gases in a wide temperature range" (Section A.3,c,(1), Session II - 8 Aug 61, afternoon)
KARGIN, V. A., Physico-Chemical Institute imeni L. Ya. Karpov, Moscow - "Vitrification phenomena in crystallin polymers" (Section B.4 - 7 Aug 61, afternoon)
KISELEV, A. V., Moscow State University imeni M. V. Lomonosov - "The influence of surface heterogeneity and adsorbate-adsorbate interaction on the adsorption properties of solid surfaces" (Joint Session, Sections A.2 and B.1 - 8 Aug 61, morning)
KONDRAT'YEV, V. N., Institute of Chemical Physics, Academy of Sciences USSR, Moscow - "The HO_2 radical" (Section A.1, Session I - 11 Aug 61, morning) (Also, Section A.1, Chairman, Session I - 8 Aug 61, morning)
KUZNETSOV, V. I., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "A novelty in the use of organic coprecipitants for concentration of small amounts of the elements" (To be presented in Russian) (Section C.2 - 11 Aug 61, morning)
LAVRUKHINA, A. K., RAKOVSKIY, E. E., and MOSKALEVA, L. P., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "New data on radiochemical investigations of the processes of fission and fragmentation induced by high energy protons" (Section A.4 - 8 Aug 61, afternoon)
LOVACHEV, L. A., Academy of Sciences USSR, Moscow - "Determination of rate constants of elementary processes from flame velocities as a function of temperature, pressure, and molecular transfer coefficients" (Section A.3,b,(2) - 7 Aug 61, afternoon)
MUNDIATH, S. (Probably MUDIYATH, S.) and GERASIMOV, Y. I., Moscow State University imeni M. V. Lomonosov - "Study of the thermodynamic properties of the system iron-latinum" (Section A.3,e,(3), Session II(A) - 11 Aug 61, morning)
PANCHENKOV, G. M., KOLCHIN, A. M., MALAKOV, V. F., and SHEYN, Ya., Moscow State University imeni M. V. Lomonosov - "Emission of complex ions in solid-phase reactions" (Joint Session, Sections A.2 and B.1, 8 Aug 61, morning)
SEMENOV, N. N., Institute of Chemical Physics, Academy of Sciences USSR, Moscow - "Certain chemical reactions at reduced temperatures and related problems of energy transfer" (To be presented in Russian) (Plenary lecture - Saturday, 12 Aug 61)
SHILOV, Ye. A., Academy of Sciences UkSSR, Kiev - "The active agents and the intermediary complexes in the heterolytic reactions of halogenation of the organic compounds" (Section A.1, Session II - 11 Aug 61, morning)
SMIRNOV, M. V., Electrochemistry Institute, Sverdlovsk - "The equilibrium between the titanium subgroup metals and the salt melts" (Section B.3 - 7 Aug 61, afternoon)
TAL'ROZE, V. L., Institute of Chemical Physics, Academy of Sciences USSR - "Reactions of ions and molecules in the gas phase" (Section A.1, Session I - 9 Aug 61, afternoon)
TERENIN, Aleksandr N., Leningrad State University imeni A. A. Zhdanov - (Section A.1, Chairman, Session I - 8 Aug 61, afternoon Session) (Also on program for Section A.1, Session I - 9 Aug 61, afternoon)
TERENIN, Aleksandr N., VILESOV, F. I., KURBATOV, B., and DODONOVA, N., Leningrad State University imeni A. A. Zhdanov - "Mass-spectrometry and luminescence of radicals in the photodissociation and photoionization of molecules by vacuum ultra-violet radiation" (Section A.1, Session I - 9 Aug 61 - afternoon)
TUNITSKIY, N. N., Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov - "On the dissociation of molecules on electron impact and the early states of radiation-chemical processes" (Section A.1, Session I - 8 Aug 61, afternoon)
YANISHEVSKIY, Emmanuil Ye., and KOROLEV, V. V., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Moscow - "The plasma generator and its use for spectral analysis of alloys and rocks" (Section C.1 - 8 Aug 61, morning)
VINOGRADOV, A. P., LAVRUKHINA, A. K., and REVINA, L. D., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "The study of nuclear reactions in iron meteorites under the action of high energy protons" (Section A.4 - 8 Aug 61, afternoon)
YAKOVLEV, Yu. V., and ALIMARIN, I. P., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "The determination of trace impurities in some materials for semiconductor techniques by radioactivation analysis" (To be presented in Russian) (Section C.1 - 8 Aug 61, afternoon)

YEROFEYEV, Boris V., Institute of Physical-Organic Chemistry, Minsk - "The effect of donor and acceptor admixtures on the decomposition rate of solids" (Section A.2 - 8 Aug 61, afternoon)

TERENIN, A. N., and PUTSEYKO, Y. K. (USSR)

"The Internal Photoelectric Effect in Agregated Chlorophyll, Methylchlorophyllide and Chloroplast Pigments."

Report presented at the 5th International Biochemistry Congress, Moscow, 10-16 Aug 1961

AKIMOV, I.A.; TERENIN, A.N.

Use of organic dyes for the optical sensitization of the internal photoelectric effect in silver bromide. Zhur.nauch.i prikl. fot. i kin. 6 no.2:108-115 Mr-Ap '61. (MIRA 14:4)

1. Gosudarstvennyy opticheskiy institut im. S.I.Vavilova.
(Photoelectricity) (Photographic emulsions)

LEVSHIN, V.L.; TERENIN, A.N.; FRANK, I.M.

Progress of S.I.Vavilov's work in the field of physics.
Usp.fiz.nauk 75 no.2:215-225 O '61. (MIRA 14:10)
(Vavilov, Sergei Ivanovich, 1891-) (Physics)

TERENIN, A.N.; LYUBOMUDROV, Ye.B.; SHABLYA, A.V.

Formation of unstable forms of phthalocyanines and hamatoporphyrin under pulsed illumination. Izv. AN SSSR. Otd.khim.nauk no.7:1206-1213 Jl '61. (MIRA 14:7)
(Phthalocyanine—Spectra) (Hematoporphyrin—Spectra)

TERENIN, A.N.

Answer to Doctor R.Mason. Biofizika 6 no. 2:246 '61. (MIRA 14:4)

1. Fizicheskiy institut Leningradskogo universiteta imeni A.N. Zhdanova.

(ELECTRONS) (CANCER)

SHABLYA, A.V.; TERENIN, A.N.

Phototransfer to protons in acridine derivatives at low temperatures, as observed in luminescence spectra. Opt.i spektr. 10 no.5:617-620 My '61. (MIRA 14:8)

(Acridine--Spectra) (Protons)

SIDOROV, A.N.; TERENIN, A.N.

Infrared spectra of phthalocyanines. Part 2: Interaction of sublimated phthalocyanine layers with gaseous CH_3COOH, HCl, and HBr. Opt. i spektr. 11 no.3:325-331 S '61. (MIRA 14:9)
(Phthalocyanine--Spectra)

S/076/61/035/007/019/019
B124/B231

AUTHOR: Terenin, A. N., Academician

TITLE: Aleksandr Georgiyevich Samartsev (on his 60th birthday)

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 7, 1961, 1651 - 1652

TEXT: On April 17, 1961, Aleksandr Georgiyevich Samartsev, outstanding scientist in the field of electrochemistry, Doctor of Chemical Sciences, Professor, Head of the laboratoriya korrozii i zashchitnykh pokrytiy Gosudarstvennogo opticheskogo instituta (Laboratory of Corrosion and Protective Coatings of the State Optical Institute) celebrated his 60th birthday which coincided with the 40th anniversary of his scientific activity. Samartsev finished his studies at the khimicheskoye otdeleniye fiziko-matematicheskogo fakul'teta Saratovskogo Gosudarstvennogo universiteta (Chemical Department of the Division of Physics and Mathematics of Saratov State University) in 1924. He started his career as a student when he began to work at the Laboratory of the Physics Institute of the afore-mentioned university; later on, he studied this special branch of science at the Leningradskiy elektrotekhnicheskiy institut (Leningrad

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S/076/61/035/007/019/019
B124/B231

Aleksandr Georgiyevich Samartsev ...

Electrotechnical Institute), and since 1929 he restricted his activity exclusively to scientific work in the field of electrochemistry. His first scientific work published contains results obtained concerning the concentration polarization in electrolysis with the use of a new, highly sensitive optical method basing on a polarization interferometer suggested by A. A. Lebedev. Further papers of the scientist dealt with the electrocrystallization of metals, the mechanism of metal oxidation processes of metals, a series of problems on electroplating; in collaboration with K. S. Yevstrop'yev, the method of a strictly stabilized current was applied to precipitating metals, and the Samartsev-Yevstrop'yev effect, named after the authors, was discovered. Subjects of further papers were the effect of surface-active substances on the electrocrystallization of metals, the "cathodic passivity", the "critical" current density, the oxidation mechanism of metals in the gaseous phase and in electrolyte solutions. In 1944, the book "Oksidnyye pokrytiya na metallakh" (Oxide films on metals) was issued, published by the Akademiya nauk (Academy of Sciences), and in 1945, the dissertation which, however, has not been published completely. At last, Samartsev is developing new technological processes for apparatus

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001755320018-9"

Aleksandr Georgiyevich Samartsev ..

construction, the electrical precipitation of metals of the Pt group, methods for the practical manufacture of highly stable mirrors, coated with reflecting layers made of rhodium and palladium, for the production of plastic metal precipitations used for cutting diffraction gratings, methods for the production of various light absorption coatings. Moreover, he is working out new forms of protective and decorative coatings. The total number of papers published by Samartsev, amounts to more than 50. A. G. Samartsev was elected deputy of the Leningradskiy gorodskoy sovet (Leningrad Municipal Soviet). He frequently assisted in the work of the commissions for the elections to the Supreme and local Soviets. In acknowledgment of his services he was awarded the Order of the Red Banner of Labor, the Badge of Honor, and various medals. There is 1 figure.

Card 3/3

PUTSEYKO, Ye.K.; TERENIN, A.N., akad.

Photoelectric sensitivity of crystalline chlorophyll and pigments of green leaves. Dokl.AN SSSR 136 no.5:1223-1226 F '61.
(MIRA 14:5)

(Chlorophyll) (Photoelectricity)

KHOLMOGOROV, V.Ye.; TELEMII, A.A., akademik

Light-induced electron paramagnetic resonance signal in crystalline chlorophyll observable in the presence of water vapor. Dokl. AN SSSR 137 no. 1:199-202 Mr-Ap '61. (MIRA 14:3)
(Chlorophyll--Spectra) (Electrons)

25334

S/020/61/138/006/010/019
B104/B214

11.4600

AUTHORS: Vilesov, F. I., Kurbatov, B. L., and Terenin, A. N., Academician

TITLE: Energy distribution of electrons in the photoionization of aromatic amines in the gaseous phase

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 6, 1961 1329 - 1332

TEXT: The energy distribution of ions was investigated by the authors with the apparatus shown in Fig. 1. The necessary ultraviolet radiation was obtained by a vacuum monochromator. The electron current in this apparatus could reach the value 10^{-13} - 10^{-12} a and was amplified by a dynamoelectric amplifier. The intensity of light was measured by a fluorescent screen of sodium salicylate and a photomultiplier. The results are shown in Figs. 2 and 3. The energy distributions of the electrons were measured on photoionization of benzene and methyl aniline for one intensity of light. The corresponding curves for aniline and

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Energy distribution of electrons...

dimethyl aniline largely coincide with the curve for methyl aniline. If the energy difference between the ionizing photons and the ionization potential of the molecules under investigation is small there appears only one maximum in this curve. As the energy of the quantum is increased this maximum is displaced toward the side of higher energy. On further increase of the photon energy new maxima appear in the region of smaller energies which are also displaced toward the side of higher energy as the photon energy is increased. The first group of slow electrons is observed in the case of benzene when the photon energy is 1.5 ± 0.1 ev above the ionization potential of the benzene molecules. For aniline, methyl aniline, and dimethyl aniline these values are: 1.2, 1.2, 1.1, ev. respectively. For these three compounds third groups of slow electrons are observed at the corresponding values of 2.4, 2.3, and 2.2 ev on further increase of the photon energy. When the photon energy lies 2.8 ev above the ionization energy of dimethyl aniline a fourth group of electrons is observed. The appearance of the new electron groups is explained with the help of the following processes: 1) ionization of the molecular ions by excitation to electron and vibrational levels; 2) dissipative ionization according to one of the schemes

Energy distribution of electrons...

S/020/61/138/006/010/019
B104/B214

$AB + h\nu \longrightarrow A^+ + B + e$ or $AB + h\nu \longrightarrow A^+ + B^-$; 3) emission of strongly bound electrons. Since no data are available at present on the electron levels of isolated ions of aromatic compounds the results obtained here cannot be fully explained. The results confirm, however, the assumption of the excitation of ions produced by the photoeffect in pigment films to the upper electron levels. There are 3 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Leningradskiy godsudarstvennyy universitet im. A. A. Zhdanova
(Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: March 20, 1961

Card 3/6

KURBATOV, B.L.; VILESOV, F.I.; TERENIN, A.N., akademik

Electron distribution by kinetic energies in the photoionization of methyl derivatives of benzene. Dokl. AN SSSR 140 no.4:707-800 O '61. (MIRA 14:9)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A.A.Zhdanova.
(Benzene) (Photoelectricity)

TERENIN, A. N. and MANDEL'SHTAM, Sergey, L.

"Vacuum u v Absorption Spectroscopy."

report to be submitted for the 1st Intl. Conference on Ultraviolet Vacuum Radiation Physics.
University of Southern California
16-19 April 1962

TERENIN, A. N.

"Spectral investigation of ion formation in the surface interaction of organic molecules with a solid."

report presented at the Intl. Symposium on Molecular Structure and Spectroscopy, Tokyo, 10-15 Sept 1962.

Leningrad State Univ. im A. A. Zhdanov.

TERENIN, A.N.; YERMOLAYEV, V.L.

Inactivation of the triplet state in aromatic molecules.
Izv. AN SSSR. Ser. fiz. 26 no.1:21-29 Ja '62. (MIRA 15:2)
(Aromatic compounds)
(Molecular dynamics)

5.4500

S/076/62/036/010/005/005
B101/B186

AUTHORS: Karyakin, A. V., and Terenin, A. N.

TITLE: Photosensitization of the fading of adsorbed methylene blue

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 10, 1962, 2286-2287

TEXT: The reduction of methylene blue by photosensitization with trypaflavine was studied. Both dyestuffs were adsorbed from aqueous solutions(10^{-4} - 10^{-5} M) on microporous glass and then exposed to the light of a 100 w lamp with a GG-13 + BG-25 Schott filter combination (370 - 500 mμ). Methods see A. V. Karyakin, Zh. fiz. khimii, 30, 986, 1956. Results: When the adsorbate consisting of trypaflavine and methylene blue was exposed to light in a vacuum, methylene blue faded much more intensively than in the control experiment without trypaflavine. Access of oxygen after 20 hrs regenerated the dyestuff in the same manner as in the control experiment. Trypaflavine alone hardly faded under the same conditions and was not regenerated by O_2. A shift of the absorption maximum of methylene blue from 680 mμ for the initial substance to 610mμ

Photosensitization of the fading of ...

for the regenerated dyestuff suggests the formation of the leucocompound of methylene blue on fading, the loss of one hydrogen atom, and demethylation into azur I and further on into thionine. This process is aided by the silanol group of the microporous glass. An inductive transfer of excitation energy from the photosensitizer trypaflavine to methylene blue is assumed as the exposure to light does not take place in the absorption maximum of methylene blue. Further experiments should explain the mechanism of similar photosensitization processes. There is 1 figure..

SUBMITTED: March 22, 1962

Card 2/2

BARACHEVSKIY, V.A.; KOTOV, Ye.I.; TERENIN, A.N., akademik

Spectra of molecular anthracene ions formed during vacuum adsorption. Dokl. AN SSSR 143 no.2:362-365 Mr '62.
(MIRA 15:3)

1. Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A.A.Zhdanova.
(Anthracene — Spectra)
(Adsorption)

BARACHEVSKIY, V.A.; KOTOV, Ye.I.; TERENIN, A.N., akademik

Spectral examination of the effect of steam on adsorbed molecular ions of anthracene. Dokl.AN SSSR 144 no.2:378-381 My '62. (MIRA 15:5)

1. Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta.
(Anthracene—Spectra) (Water vapors)

TERENIN, A. N.

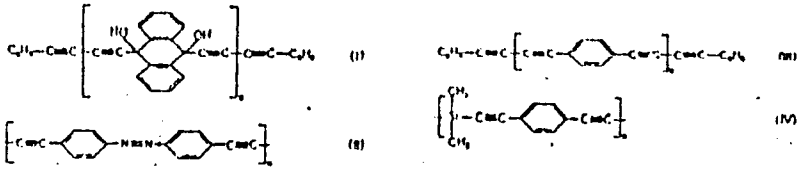
S/020/62/144/004/019/024
B101/B138

AUTHORS: Myl'nikov, V. S., Sladkov, A. M., Kudryavtsev, Yu. P., Luneva, L. K., Korshak, V. V., Corresponding Member AS USSR, and Terenin, A. N., Academician

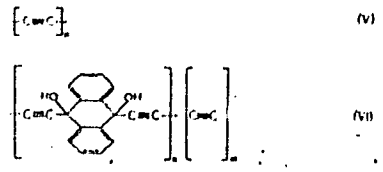
TITLE: Photo-semiconductor properties of acetylene polymers

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 4, 1962, 840 - 843

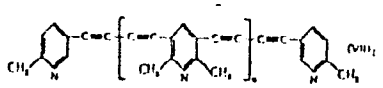
TEXT: Data for the polyacetylenes I - VIII are reported from the laboratory directed by A. N. Terenin where research on photosensitive polymers has long been proceeding. The compounds were synthesized in the laboratory directed by V. V. Korshak. I, II and III were very photosensitive in



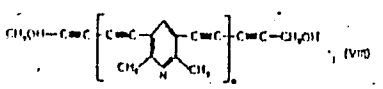
Card 1/3



(V)



(VII)



(VIII)

modulated light (10 mv/mw at 300 cps). IV, V and VI were less photo-sensitive; VII and VIII showed no photo-emf. In I - IV the conductivity was of p type, in V and VI it was of n type. I and II were examined more closely. Results: (1) The spectral distribution of photo-emf showed a reduction in this effect at 200 → 600 mμ with a narrow selective peak of exciton type at λ = 480 mμ in the case of I and a wide peak in this range for II. (2) Preliminary illumination of II for 2 hr in ultraviolet light from an OBK-120 (SVD-120) mercury lamp increased its photo-emf by one order of magnitude. The long-wave threshold of activation is at 366 mμ and the 405 mμ line is inactive. (3) Preliminary illumination is more effective in vacuo than in air. The photo-emf of I increases during the first

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3 - 5 min lighting, then slowly decreases, but after approx. 1 hr regains its initial value. After 1 - 2 hr storage in the dark this process is repeatable. (4) If II is activated by UV light in vacuo the admission of air immediately reduces its photo-emf to 1/2 - 1/3. This effect is also repeatable. These results are explained by the UV light ionizing the conjugated molecules so that positively charged local centers are formed which act as electron traps. The photoelectron is retained in the polymer structure according to E. C. Lim, G. W. Swenson (J. Chem. Phys., 36, no. 1, 118 (1962)). The absorption of light permits the origination of an exciton which migrates between the molecules and disintegrates on a defect produced by the UV light to form a mobile hole and an electron trapped by the defect. Accordingly it should be possible to synthesize photosensitive polymers. There are 3 figures.

SUBMITTED: April 20, 1962

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resulting imine groups. Pheophytin reoxidized in air showed the spectrum of the initial substance with slight changes caused by irreversible reductions. Separation of S was observed which confirms the assumed course of the reaction. There are 2 figures.

SUBMITTED: May 18, 1962

Fig. 2: Photoreduction of pheophytin. (0) skeleton of the pheophytin molecule; (1) primary photoreduced form; (2) secondary photoreduced form. Solid line: 18-membered ring of conjugated bonds; dotted line: addition of an electron to the system of conjugated bonds.

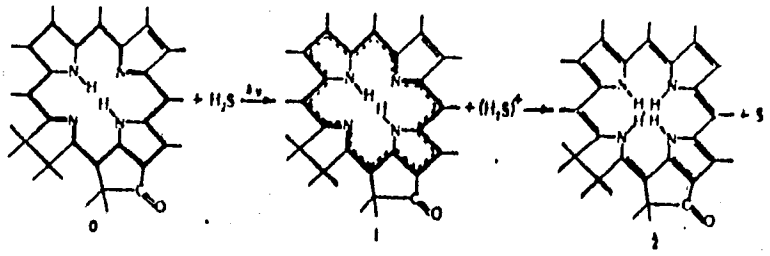

Fig. 2

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S/020/62/146/001/014/016
B101/B144

AUTHORS: Baranov, E. V., Kholmogorov, V. Ye., Terenin, A. N., Academician

TITLE: Photoinduced epr signals in zinc oxide

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 1, 1962, 125 - 128

TEXT: ZnO samples were exposed to ultraviolet or visible light in vacuo or in air at room temperature or at 77°K and the epr signals were measured. Results: (1) ZnO not annealed and ZnO annealed in air at 500°C showed no epr signals at 20°C either in the dark or when exposed to light. (2) Irradiation at 77°K produced a line with g = 1.964 (line I), ΔH = 4.5 oersteds, and a line with g = 2.018 (line II), ΔH = 3.0 oersteds, both in air and in vacuo. Both lines are preserved at 77°K in the dark, but disappear at 20°C in the sample illuminated in air. (3) In vacuo, line II disappears and line I becomes weaker. The effect is repeatable. (4) At 77°K, the epr signals occur not only on irradiation with λ = 365 mμ, but also on irradiation with visible light; their intensity, however, decreases if the wavelength increases. (5) ZnO which had been in a

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Photoinduced epr signals...

10^{-4} mm Hg vacuum at 20°C for 2 hrs gave no signal in the dark but an intensive line I with ΔH = 7.5 oersteds on illumination; the conductivity of the sample increased. (6) ZnO annealed at 450°C in vacuo and not illuminated gave an intensive line I, ΔH = 7.5 oersteds, the conductivity increasing strongly. Oxygen supplied at 10^{-3} mm Hg reduced the signal intensity. (7) Contact of O_2 with ZnO heated to 100-250°C produced an intensive signal with g = 2.004 (line III). Adsorption of O_2 at 20°C gave an asymmetric signal with $g_{\perp}$ = 2.003, $g_{\parallel}$ = 2.008. An increase of p_{O_2} from 10^{-3} to 100 mm Hg made line I disappear. Conclusions: Line I corresponds to photodesorption of O_2 from the ZnO surface. Line III corresponds to chemisorption of atomic oxygen having an unpaired electron. The cause of line II remains unexplained. Preliminary experiments have shown that epr signals are also produced on addition of organic dyes whose spectral absorption range is different from that of ZnO. There are 2 figures and 1 table.

SUBMITTED: April 20, 1962

Card 2/2

KHOLMOGOROV, V.Ye.; TERENIN, A.N., akademik

Light-induced signals of electron peramagnetic resonance in organic dye crystals. Dokl. AN SSSR 146 no.3:652-655 S '62. (MIRA 15:10)
(Dyes and dyeing—Spectra) (Photoelectricity)

KLYUYEV, Yu.A.; TERENIN, A.N., akademik

Vibrational absorption spectrum of chloroform as affected by pressure. Dokl. AN SSSR 147 no.3:653-655 N '62. (MIRA 15:12)

1. Institut fiziki vysokikh davleniy AN SSSR i Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova.
(Chloroform—Spectra)

KHOLMOGOROV, V. Ye.; SIDOROV, A. N.; TERENIN, A. N., akademik

Light-induced electron paramagnetic resonance signals in chlorophyll in the crystalline state and its infrared spectra. Dokl. AN SSSR 147 no.4:954-957 D '62.

(MIRA 16:1)

(Chlorophyll—Spectra)
(Paramagnetic resonance and relaxation)

BARACHEVSKIY, V.A.; KHOLMOGOROV, V.Ye.; KOTOV, Ye.I.; TERENIN, A.N., akademik

Absorption spectra and electron paramagnetic resonance spectra of positive acene ions formed in vacuum adsorption. Dokl. AN SSSR 147 no.5:1108-1111 D '62. (MIRA 16:2)

1. Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo universiteta im. A.A. Zhdanova.
(Acenes—Spectra) (Adsorption)

4454 3
S/020/62/147/006/028/034
B144/B186

15.2100

AUTHORS: Alekseyev, A. V., Filimonov, V. N., Terenin, A. N., Academician

TITLE: Infra-red spectra of nitrous oxide adsorbed on synthetic zeolites

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 6, 1962, 1392 - 1395

TEXT: The adsorption of NO on synthetic A and X type zeolites, in Na and Ca forms with pore diameters of 4 and 5 Å and on natural zeolites such as natrolite and desmine, was studied by IR spectroscopy. The presence of adsorption centers and the formation of intermediate products needs clearing up. The spectra were recorded in the 2400 - 1200 cm^{-1} range on powdered zeolites placed between fluorite plates with intermediate aluminum foils, and subjected to a vacuum pretreatment of 4 - 8 hrs at 400°C. The final gas pressure of 40 mm Hg excluded the recording of gaseous NO which has a band at 1876 cm^{-1}. A comparison between the spectra of the pure zeolites and those resulting after NO adsorption showed bands shifted by more than 300 cm^{-1} to the right and

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Infra-red spectra of nitrous oxide ...

to the left of the NO band, revealing the formation of other nitrogen oxides. This was verified by recording the IR spectra of N_2O and NO_2 adsorbed on a CaA zeolite. The bands at 2250, 1300 and all low-frequency bands belong undoubtedly to N_2O forming by the reaction: $2NO_{ads} \rightarrow N_2O_{ads} + O_{ads}$. Unlike the 1616 and 1322 cm^{-1} bands of gaseous NO_2, the IR spectrum of the adsorbed NO_2 shows bands at 1350 - 1490 cm^{-1} due to the formation of the NO_3^- group, and bands at 1940 and 2110 cm^{-1} resulting from a decomposition of the NO_2 molecule with formation of chemisorbed NO. This agrees with published data on the ionic form NO^+(2100 - 2400 cm^{-1}) and the coordination bond of NO with electrophilic centers (1940 cm^{-1}). Thus the presence of electrophilic and electron-acceptor centers can be assumed on the surface of these zeolites. There are 3 figures.

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Infra-red spectra of nitrous oxide ... S/020/62/147/006/028/034
B144/B186

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova (Scientific Research Physics Institute of the Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: July 30, 1962

Card 3/3

TERENIN, A. N.

"Spectra of Molecular Ions Formed During Vacuum Adsorption of Aromatic Compounds on Alumino-silicate Glass"

Seventh European Conference on Molecular Spectroscopy Budapest, 22-27 Jul'63

Instituteof Physics, Leningrad University

TERENIN, A. N.; VILESOV, F. I.

"Mass-Spectrometry of Organic Molecules with Photon Ionization."

report submitted to 11th Intl Spectroscopy Colloq, Belgrade, 30 Sep-4 Oct 63.

Physical Inst, Leningrad Univ.

B/030/63/000/003/[illegible]/[illegible]
B117/B186

AUTHORS: Terenin, A. N., Academician, Kusakov, M. M., Doctor of Chemical Sciences, Yel'yashevich, M. A., Academician BSSR

TITLE: Symposium on molecular structure and spectroscopy

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 3, 1963, 118-119

TEXT: This is a brief report on the Simpozium po molekulyarnoy strukture i spektroskopii (Symposium on Molecular Structure and Spectroscopy) which took place in Tokyo from Sept. 10 to 15, 1962. The Symposium was attended by 300 scientists, among them 700 from Japan and about 200 from 25 other countries. The USSR was represented by V. N. Kondrat'yev, member of the Ispolnitel'nyy komitet Mezhdunarodnogo soyuza teoreticheskoy i prikladnoy khimii (Executive Committee of the International Union for Theoretical and Applied Chemistry) and by the authors of this paper. More than 250 lectures were delivered.

Card 1/1

S/0051/63/015/006/0837/0838

ACCESSION NR: AP4009478

AUTHOR: Koby*shev, G.I.; Lyalin, G.N.; Terenin, A.N.

TITLE: Manifestation of a hydrogen bond in the luminescence spectrum of magnesium phthalocyanine with uranyl nitrate hexahydrate

SOURCE: Optika i spektroskopiya, v.15, no.6, 1963, 837-838

TOPIC TAGS: hydrogen bond, protonization, magnesium phthalocyanine, uranyl nitrate, magnesium phthalocyanine luminescence

ABSTRACT: In an earlier investigation (G.I.Koby*shev, G.N.Lyalin and A.N.Terenin, DAN SSSR,148,1294,1963) in which photoluminescence was employed to study excitation energy transfer from the coordinated UO_2^{++} ion to magnesium phthalocyanine in ethyl alcohol solutions there was established the following unique effect: at 290°K there is present in the luminescence spectrum of Mg phthalocyanine the usual narrow peak of this compound at 673 mμ together with a number of secondary longer wavelength peaks, but upon freezingof the solution (cooling to 77°K) this peak virtually disappears and a new peak at 703 mμ appears in the sensitized luminescence spectrum. It was inferred that the new band was due to a protonized form of the pigment. Ac-

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AP4009478

cordingly, in the present study there were recorded the fluorescence spectra of magnesium phthalocyanine molecules adsorbed on silica gel and aluminosilica gel under conditions of higher resolution (DFS-4 diffraction grating spectrometer with photoelectric recording). In the case of both adsorbants there was observed the same strong peak at 702 mμ. In view of the fact that these different adsorbants have in common the presence of proton donor centers, it is logical to attribute the new peak to a protonized form of Mg phthalocyanine, i.e., to a formation of a hydrogen bond. The probable mechanism of protonization is discussed and other features of the luminescence spectrum of protonized Mg phthalocyanine are described. Orig.art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 23May63 DATE ACQ: 03Jan64 ENCL: 00

SUB CODE: PH,CH NR REF SOV: 006 OTHER: 000

Card 2/2

TERENIN, A. N.

AID Nr. 967-5 19 May

ENERGY TRANSFER FROM URANYL CATION TO PHTHALOCYANIN IN SOLUTION AND IN ADSORBED STATE (USSR)

Kobyshev, G. I., G. N. Lyalin, and A. N. Terenin. IN: Akademiya nauk SSSR. Doklady, v. 148, no. 6, 21 Feb 1963, 1294-1297.

S/020/63/148/006/010/023

A spectrophotometric study has been conducted of excitation energy transfer from uranyl cations to phthalocyanin at various temperatures. Solutions of H_2 phthalocyanin in dioxane and Mg phthalocyanin in ethanol with 10^{-4} to 10^{-5} M concentrations were used with 10^{-3} to 10^{-4} M uranyl nitrate or uranyl acetate additive. The addition of uranyl salts produced, with proper illumination, a ten- to twentyfold increase in the intensity of luminescence of both phthalocyanin solutions; however, the addition of magnesium or vanadyl salts produced no effect, eliminating ionic effects on higher levels of the pigment as a possible explanation. Along

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AID Nr. 967-5 15 May

ENERGY TRANSFER [Cont'd] S/020/63/148/006/010/023

with the increased luminescence in the presence of uranyl cations, an anomalous temperature dependence of luminescence was observed which was most pronounced in the case of H_2 phthalocyanin with uranyl acetate in dioxane. The dependence of spectra on wavelength of the excitation light was studied, as well as energy transfer between uranyl ions and phthalocyanin, adsorbed on magnesium oxide. [BB]

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10

ACCESSION NR: AP3004484 S/0048/63/027/008/0994/0995

AUTHOR: Sena, L. A.

TITLE: Second All-Union Conference on the Physics of Electron and Atom Collisions [Uzhgorod, 2—9 October 1962]

SOURCE: AN SSSR. Izvestiya, ser. fiz., v. 27, no. 8, 1963, 994-995

TOPIC TAGS: conference, electron collision, atom collision, collision physics

ABSTRACT: The II Vsesoyuznaya konferentsiya po fizike elektronny*kh i atomny*kh stolknoveniy (Second All-Union Conference on the Physics of Electron and Atoms Collisions), was held in Uzhgorod, 2—9 October 1962. The following reports were presented: "Theory of the charge-exchange process during atomic collisions," by Yu. N. Demkov; "Charge-exchange of multicharge ions," by I. P. Flaks; "Ionization due to atomic collisions," by N. V. Fedorenko; "Excitation of atoms and molecules due to electronic collisions," by L. P. Zapesochny*y; "Charge exchange and ionization during atomic collisions in the high-energy range," by V. S. Nikolayev; "Photoionization of gases and vapors by vacuum ultraviolet radiation," by Academician A. N. Terenin and F. I. Vilesov; "Effective cross sections of atomic collisions important in the theory of gaseous quantum generators," by I. I. Sobel'man; "Dissociation of molecules and ions during collisions of fast particles," by N. N. Tunitskiy; and "Corpuscular diagnostic of plasma," by V. V. Afrosimov.

ASSOCIATION: none

S/020/63/149/001/021/023
B101/B144

AUTHORS: Kholmogorov, V. Ye., Baranov, E. V., Terenin, A. N., Academician

TITLE: Study of the sensibilization of photo-dehydrogenation of alcohols at 77°C using the epr method

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 1, 1963, 142-145

TEXT: On taking the epr spectrum of the photo reaction that attends the stripping of one electron from aromatic amines at 77°K in alcohol-ether solution, (this reaction occurring under the effect of $\lambda\lambda < 313$ mμ) an intensive formation of alcohol radicals was observed at UV wavelengths $\lambda\lambda > 334$ mμ. This effect was studied in 10^{-3} - 10^{-1} mole/l solutions of aniline, diphenyl amine, triphenyl amine, carbazole, fluorene and naphthalene in methanol, ethanol, i-propanol, n-butanol, and i-butanol at 77 and 90°K. Results: When the solvents alone were irradiated with UV light at 77 or 90°K, merely small amounts of radicals characteristic of the respective alcohol formed. In the presence of aromatic amines and of carbazole 10^{-4} - 10^{-3} mole/l radicals formed within a few seconds. The epr

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Study of the sensibilization of ...

spectra showed that the radicals are formed by the knocking-out of one H atom in a position. The radicals are unstable and their spectrum changed in the dark when the temperature was increased. When the solution was not [illegible], peroxide radicals formed at 0°C. Presumably photo-dehydrogenation of alcohols is caused by excitation of the singlet level of the amines and the carbazole, which turns into the phosphorescent triplet state. This could be proved by selective desactivation of the triplet state by naphthalene. [illegible] itself did not phosphoresce at 77°K. In the presence of triphenylamine or carbazole, intensive phosphorescence sets in and stable radicals form, but only [illegible] of the quantity observed in the absence of naphthalene. There are 3 figures and 2 tables.

SUBMITTED: December 11, 1962

Card 2/2

TERENIN, A N

AID Nr. 977-12 27 May

PHOTOCONDUCTIVITY OF ACETYLENE POLYMERS (USSR)

Myl'nikov, V. S., Ye. K. Putseyko, and A. N. Terenin. IN: Akademiya nauk SSSR. Doklady, v. 149, no. 4, Apr 1963, 897-900.
S/020/63/149/004/020/025

The study of photoconduction in polyacetylenes as exemplified by poly(4, 4'-diethynylazobenzene) (I) has been continued. The spectral curves of 1) transverse photoconductivity (i_{ph}/w), 2) diffusion photo-emf (V_{ph}/w) (both reduced to equal incident energy), and 3) light absorption ($1 - R\lambda$) were recorded at 17° C (see figure). In the first case the d-c method under constant illumination was used. The test specimens consisted of thin films of I deposited from dimethylformamide onto a quartz plate with Pt electrodes, the voltage across the electrodes was 100 to 200 v. In the second case the condenser method and powder specimens were used. A mercury-vapor lamp was employed for illumination with integral light since incandescent-lamp illumination had only slight effect on photoconductivity. The effect of ultraviolet illumination on the spectra is shown

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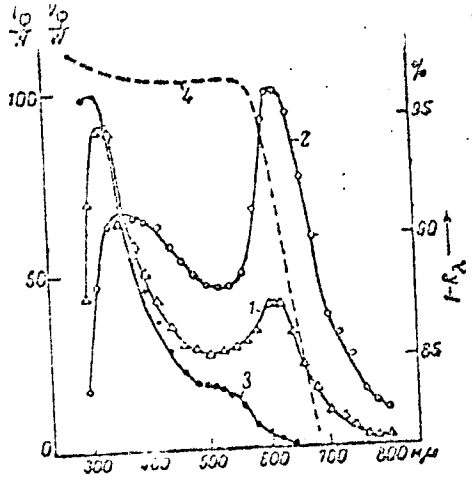
AID Nr. 977-12 27 May

S/020/63/149/004/020/025

PHOTOCONDUCTIVITY [Cont'd]

in the figure. Curves 1 and 4 indicate conductivity and absorption without prior illumination, curves 2 and 3 show conductivity and emf after UV illumination for 10 min. The fact that conductivity shows a peak at 610 mμ, while the emf peak is barely noticeable at 500 mμ is explained by the correspondence of the conductivity to the absorption drop. Such correspondence is typical of photoconductors. The UV-induced rise in conductivity at 610 mμ is attributed to the formation of electron trapping centers in I which was previously shown to exhibit p-type conductivity. The UV-induced shift of the 300 mμ-peak to 310 mμ is ascribed to further the photopolymerization caused by the rise in conductivity. The detection of light-induced



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PHOTOCONDUCTIVITY (Cont'd) S/020/63/149/004/030/035

EPR signals in I confirmed the presence of the centers. The photoconductivity mechanism is assumed to be similar to that in organic dyes. Compound I was synthesized at the Institute of Organoelemental Compounds, Academy of Sciences USSR, and made available for study by V. V. Korshak and A. M. Sladkov. The optical activation energy of conduction for I was calculated to be 1.82 ± 0.02 ev.

[SVM]

L 12839-63 EWP(j)/EPF(c)/EWP(m)/BDS ASD Pc-4/Pr-4 RM/WW
ACCESSION NR: AP3003227 S/0020/63/150/006/1311/1314

67
65

AUTHOR: Shakhverdov, P. A.; Terenin, A. N. (Academician)

TITLE: Investigation of intramolecular electron transfer in tetrapyrrole pigments during pulse illumination

SOURCE: AN SSSR. Doklady,* v. 150, no. 6, 1963, 1311-1314

TOPIC TAGS: electron transfer, intramolecular electron transfer, tetrapyrrole pigment, pyrrole, pyridine, dioxane, dimethylformanine, ethanol, acetone, styrene, polystyrene, benzidine, phenylamine, magnesium phthalocyanin

ABSTRACT: In experiments designed to separate H atom transfer from electron transfer in the primary photoreduction reaction, magnesium phthalocyanin and hematoporphyrin were used as the test pigments and phenol, diphenylamine, triphenylamine and benzidire as the reducing agents. An improved pulse device (flash duration reduced to 2.5 microseconds at an energy of 350 joules by decreasing the discharge circuit to 0.05 microhenry). An IFK-2000 pulse lamp delivering a constant current of light during the observation period was used as the translucent source, which made it possible to extend spectral measurements

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to 250 millimicra and improve the "signal to noise" ratio. The recording apparatus consisted of a ZMR-3 monochromator. Photographs of the oscillograms were projected on the screen of a P-10 projector, and, after repeated measurements at various wavelengths, the photo-induced changes were graphed as a function of wavelength. Exposure to light impulses was carried out in the absorption band of the test pigments, which were studied in various solvents (Pyridine, dioxane, dimethylformamine, ethanol, acetone, styrene and polystyrene). The maxima at 400 and 500 millimicra obtained with a solution of magnesium phthalocyanin in pyridine correspond approximately with the triplet band previously observed with a photographic method, but, in the presence of dissolved phenol or benzidine in acetone, an additional maximum appears at 440 millimicra. This new maximum may be due to the capture of an electron from phenol by the Mg phthalocyanin molecule. The more intensive maximum at 450-460 millimicra noted in dioxane + phenol is also ascribed to a pigment anion-radical. In the case of hematoprophyrin, the additional absorption band with a maximum at 470 millimicra appearing in the presence of dimethylformamine and persisting throughout the typical photo-reduction reaction is not thought to be attributable to the absorption of triplet molecules. This is confirmed by the

L 12839-63
ACCESSION NR: AP3003229

absence of this maximum with hematoporphyrin in dioxane, despite the occurrence of the usual reversible photodiscoloration. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 02May63	DATE ACQ: 24Jul63	ENCL: 00
SUB CODE: CH, PH	NO REF SOV: 010	OTHER: 007

Card 3/3

ACCESSION NR: AP3004[illegible] S/[illegible]/63/151/001/0122/0124

AUTHORS: Dmitriyevskiy, O. D.; Terenin, A. N. (Academician)

TITLE: Analysis of intermolecular electron transfer processes during pulsed illumination

SOURCE: AN SSSR. Doklady*, v. 151, no. 1, 1963, 122-124

TOPIC TAGS: pulsed illumination, electron transfer, wavelength

ABSTRACT: The absorption spectra of intermediate products, vanishing at the instant of photo-impulse were registered by the photoelectric labor-intensity, [illegible] in the wavelength. The results are given by a figure and [illegible] in detail. This art. has 1 figure.

ASSOCIATION: none

SUBMITTED: 02Apr63 DATE ACQ: 30Jul63 ENCL: 00

SUB CODE: PH, CH NO REF SOV: 001 OTHER: 005

Card 1/1

SIDOROV, A.N.; VOROB'YEV, V.G.; TERENIN, A.N., akademik

Spectral study og the photoreduction of tetraphenylporphine.
Dokl. AN SSR. 152 no.4:919-922 O '63. (MIRA 16:11)

BARACHEVSKIY, V.A.; KHOLMOGOROV, V.Ye.; TERENIN, A.N., akademik

Concentration effect in the absorption spectra and electron paramagnetic resonance of adsorbed molecular ions of anthracene. Dokl. AN SSSR 152 no.5:1143-1146 O '63. (MIRA 16:12)

1. Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A.A.Zhdanova.

KHOLMOGOROV, V.Ye., BARANOV, E.V.; TERENIN, A.N., akademik

Role of the triplet state of aromatic amines in the photochemical reaction of dehydrogenation of alcohols at 77°K. Dokl. AN SSSR 152 no.6:1399-1402 O '63. (MIRA 16:11)

KOBYSHEV, G.I.; LYALIN, G.N.; TERENIN, A.N., akademik

Photoreaction of Mg-phthalocyanin with a coordinated uranyl cation. Dokl. AN SSSR 153 no.4:865-868 D '63. (MIRA 17:1)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova.

ARVAN, Kh.L.; TERENIN, A.N., akademik

Photosensibilized reduction of thiazine dyes on sols and in solutions. Dokl. AN SSSR 153 no.5:1093-1096 D '63.
(MIRA 17:1)

L 18140-63 EPF(c)/EWT(1)/EWT(m)/BDS/ES(w)-2 AFFTC/ASD/ESD-3/IJP(C)/SSD
Pr-4/Pab-4 RM/WW/JW/MAY S/0048/63/027/008/1083/1087
ACCESSION NR: AP3004506

AUTHOR: Akopyan, M.Ye.; Vilesov, F.I.; Terenin, A.N.

TITLE: Mass-spectrometric investigation of photoionization of molecules and disintegration of excited molecular ions /Report presented at the Second All-Union Conference on the Physics of Electronic and Atomic Collisions held in Uzhgorod 2-9 Oct 1962/

SOURCE: AN SSSR, Izvestiya, ser.fiz.,v.27, no.8, 1963, 1083-1087

TOPIC TAGS: photodissociation, photoionization, ionization threshold, hydrazine, hydrazine derivative

ABSTRACT: The paper gives some of the results obtained in investigating photoionization of some alkyl derivatives of hydrazine. An extensive sereis of derivatives were studied, but curves characterizing the efficiency of different ionization processes as a function of the photon energy are given only for methyl- and n-butylhydrazine. The experiments were carried out by means of a set-up consisting of an MI-1305 mass spectrometer coupled to an MV-3 vacuum monochromator. In the course of photoionization of complex molecules (such as hydrazine derivatives) a number of different processes occur, leading to dissociation and the formation of different

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ions. Mass-spectrometric study of the products of photoionization of alkyl derivatives of hydrazine showed, however, that in the case of these molecules dissociative ionization processes play a significant role, and in the case of the more complex molecules becomes predominant. Frequent references are made to the literature and data on photoionization of other compounds, such as ammonium and alkylamines, and some of the present results are tentatively interpreted on the basis of the literature data. It is shown that in the case of hydrazine and its derivatives, as in the case of alkylamines, for example, there is a definite photoionization threshold (located at about 7.6 eV for hydrazine derivatives), below which photoionization falls off to zero. For the more complex molecules there is a definite break in the ionization efficiency versus photon energy curve at about 7.7 eV (no breaks were observed in the investigated energy range for the simpler molecules). The bond rupture energies and photoionization thresholds for hydrazine and some of its derivatives are tabulated. More detailed data will be published elsewhere (M.Ye.Akopyan and F.I.Vilesov, Kinetika i kataliz,4,39,1963).Orig.arg.has: 3 formulas, 4 figures and 2 tables.

L 18140-63
ACCESSION NR: AP3004506

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy instituto Leningradskogo gos. universiteta im.A.A.Zhdanova (Scientific Research Institute of Physics, Leningrad State University)

SUBMITTED: 00	DATE ACQ: 26Aug63	ENCL: 00
SUB CODE: PH, CH	NO REF SOV: 004	OTHER: 008

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L 18138-63 EWP(j)/EPF(c)/EWT(m)/BDS Pc-4/Pr-4 RM/WW/JW/MAY/JFW

ACCESSION NR: AP3004508 S/0048/63/027/008/1094/1096

70
68

AUTHOR: Dodonova, N.Ya.; Teronin, A.N.

TITLE: Excitation of free radicals incident to dissociation of polyatomic molecules by UV photons /Report presented at the Second All-Union Conference on the Physics of Electronic and Atomic Collisions held in Uzhgorod 2-9 Oct 1962/

SOURCE: AN SSSR, Izvestiya, ser.fiz., v.27, no.8, 1963, 1094-1096

TOPIC TAGS: radical detachment, free radicals, photolysis, NH_2, CH, OH, amine, hydrazine

ABSTRACT: The present work was a continuation of studies initiated in 1934 by A. N.Teronin and G.G.Neuymin (Izv.AN SSSR,Ser.fiz.mat.,No.4,529,1939), who discovered luminescence of OH, NH_2, CN and CHO radicals incident to photolysis of ammonium, hydrazine, acetonitrile and formic acid vapors by $\lambda > 1250$ Å radiation from a hydrogen discharge tube. Since then other investigators, Soviet and foreign, have contributed to the field. In the present study there were investigated the emission spectra of radicals formed as a result of photodissociation of a number of amines, hydrazine derivatives and other compounds under the influence of the radiation from a 1 kW high-voltage hydrogen discharge tube with a thin fluorite window ($\lambda > 1250$ Å

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L 18138-63
ACCESSION NR: AP3004508

2

which corresponds to about 10 eV). The luminescence spectra of the radicals were photographed with the aid of quartz and glass optics spectrographs at right angles to the direction of the incident radiation. The vapor pressure was about 1 mm Hg or was determined by the vapor pressure of the substances at room temperature. The results are summarized in a table which lists the investigated compounds and the radicals (NH_2, CN and OH), the characteristic spectra of which were detected. The radical detachment energies are noted for some compounds. Measurements indicated a linear dependence of the CN band intensities on the intensity of the incident radiation for some compounds, which may be taken as an indication of the absence of step photolysis. The formation of nitrogen containing compounds under the experimental conditions can be explained on the assumption that nitrogen molecules are present in a metastable state with sufficient excess energy to provide for significant chemical activity. "Laboratory technician M.V.Rudenko participated in the experimental part of the work." Orig.art.has: 2 formulas, 1 figure and 1 table.

ASSOCIATION: Laboratoriya fotokataliza, Leningradskiy gos. universitet im.A.A.Zhdanova (Photocatalysis Laboratory, Leningrad State University)

SUBMITTED: 00 DATE ACQ: 23Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 000

Card 2/2

TITLE: Photosemiconductor properties of metal acetylides

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001755320018-9"

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001755320018-9"

L 13411-63 BDS

ACCESSION NR: AP3004127 S/0020/63/150/002/0407/0410

AUTHOR: Lyalin, G. N.; Koby*shev, G. I.; Terenin, A. N. 16

TITLE: Quenching of luminescence of carotenoid adsorbants

SOURCE: AN SSSR. Doklady, v. 150, no. 2, 1963, 407-410.

TOPIC TAGS: luminescence quenching, carotenoid adsorbants, lability, Beta-carotine, lutein

ABSTRACT: The adsorbants and solutions of Beta-carotine and the structurally related lutein which enter into the composition of the pigments of a photo-synthesizing plant were studied. The lability degree of addition of [illegible] to the molecules of these pigments was explained in detail by the luminescence quenching method. "We wish to express our thanks to Professor S. I. Sapozhnikov for submitting Beta-carotine and lutein specimens and to V. I. Shirokov for carrying out the fluorometric measurements." Orig. art. has: 3 figures and 1 formula.

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova (Scientific Research Institute of Physics, Leningrad State University)

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of absorption bands of its triplet state. An absorption spectrum

excited molecules indicates that these states participate in electron transfer processes.

[redacted], A.N.; [redacted], [redacted], [redacted], B.N.

Impulse photostimulation of the derivatives of hematoporphyrin, chlorophyll, leaf pigments and Mg-phthalocyanine. Biofizika 9 no. 1:25-32 '64. (MIRA 17:7)

BARACHEVSKIY, V.A.; [illegible], A.N.

Electron absorption spectrum of [illegible] molecules.
Opt. i spektr. 16 no.6:[illegible] Je '64. [illegible]

BARACHEVSKIY, V.A.; TERENIN, A.N.

Spectra of positive benzene ions. Opt. i spektr. 17 no.2: 304-306 Ag '64 (MIRA 17:8)

L 22426-66 EWT(d)/EWP(k)/EWP(l)

ACC NR: AP6013622 SOURCE CODE: UR/0105/65/000/009/0089/0089

AUTHOR: Bogoroditskiy, N. P.; Vinokurov, V. I.; Yermolin, N. P.; Lebedev, A. A.; Potsar, A. A.; Terenin, A. N.; Fremke, A. V.

ORG: none

TITLE: Honoring the 70th birthday of Professor Boris Pavlovich Kozyrev

SOURCE: Elektrichestvo, no. 9, 1965, 89

TOPIC TAGS: academic personnel, electric engineering personnel, IR research, spectroscopy

ABSTRACT: On 1 August 1965 was the 70th birthday of Honored Activist of Science and Engineering RSFSR, Laureate of the State Prize, Dr. Techn. Sci., Professor Boris Pavlovich Kozyrev. Professor Kozyrev's life-work has been inseparably connected since 1921 with the Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov (Lenin), where he rose from the post of assistant to that of full professor - head of the Chair of Principles of Electrovacuum Engineering and Scientific Head of the Problems Laboratory of Radiation Electronics and Vacuum Engineering. Boris Pavlovich Kozyrev has made a series of important scientific contributions to vacuum engineering, optical electronics, and infrared engineering. In 1950 he was awarded the State Prize for the development and introduction of photoptical amplification of weak signals, which contributed to the expansion of research into

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UDC: 621.38:535

T 22626-66

ACC NR: AP6013622

spectroscopy and infrared engineering in the Soviet Union. The Problems Laboratory which he heads is one of the major Soviet centers of research into thermal radiation sensors which are successfully applied in spectroscopy, atmospheric optics, actinometry, limnology, and studies of the processes of photosynthesis. Professor Kozyrev has at various times been a member of or consultant to scientific and technical councils in different research institutes. He is the author of approximately 150 works and inventions. In addition he is an excellent educator, author of guides and textbooks, faculty dean, the mentor of a large number of graduate students, and a civic-minded person who takes an active part in political and social life. He is the holder of many medals, orders, and other awards. Orig. art. has: 1 figure. [JPRS]

SUB CODE: 09, 20 / SUBM DATE: none

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